Amendments to the Drawings:

FIG. 11 is amended to change the location of the lead line for reference number 7 on the left side of the drawing.

Attachment: Replacement Sheet

REMARKS

Favorable consideration and allowance of claims 1-3, 5-10, 13-14, 16-17, and 19-20 are requested in view of the foregoing amendments and the following remarks.

The title of the invention is objected to as not being descriptive. The title is amended herein to further describe the invention as an "Optical Sensor Including Photoconductive Material and Carbon Nanotube." Accordingly, this objection should be removed.

Claims 1, 2, 9 and 16 are rejected under 35 U.S.C. § 102(e) as being anticipated by Watanabe et al. (US 6,724,064).

Claims 10 and 20 are rejected under 35 U.S.C. § 103(a) as being obvious over Watanabe in view of Stettner et al. (US 6,690,019).

Claims 3-8, 11-15 and 17-19 are objected to as being dependent upon a rejected base claim, but we be allowable if rewritten in independent form including the limitations of the base claim and any intervening claims. Applicant thanks the Examiner for acknowledging the allowability of these claims. Due to the below-described allowability of claim 1, however, claims 3-8, 11-15, and 17-19 are not written in independent form at this time.

Claim 1 is amended to further define the claimed optical sensor and amendments are made to some of the dependent claims as shown above.

Support for these amendments is present in at least pages 10-11, 14-16, and 18 of the specification.

Applicant submits that Watanabe does not expressly or inherently disclose a carbon nanotube formed on a transparent or translucent insulating layer, which is formed on a photoconductive material layer, as claimed in amended claim 1.

As described in claim 1, a carrier, which is generated inside of a photoconductive material layer irradiated with a light or electromagnetic wave, is sensed as a change of electrical conduction of the carbon nanotube. The carbon nanotube itself does not function as an optical receiver. Accordingly, the existence or intensity of the light or electromagnetic wave with which the photoconductive material layer is irradiated can be sensed even if the carbon nanotube itself is not irradiated with the light or electromagnetic wave.

By contrast, in Watanabe, a carbon nanotube serves as an optical receiver. The carbon nanotube is irradiated with optical pulses, and then the optical pulses are converted into high frequency waves or electromagnetic waves. Thus, the optical pulses cannot be sensed when the carbon nanotube is not irradiated with the optical pulses.

As described in Applicant's claim 1, the carbon nanotube is placed above the photoconductive material layer through the insulating layer so that a dark current can be reduced and irradiation with the light or electromagnetic wave can be sensed with high sensitivity. Watanabe, however, has no such structure

in which a carbon nanotube is placed on a substrate through an insulating layer. Thus, the structure of Watanabe differs from that of the optical sensor of claim 1 of the present invention, and the same effect as the present invention cannot be obtained.

Further, Watanabe does not expressly or inherently disclose that the photoconductive material layer is irradiated with the light or electromagnetic wave through the transparent or translucent insulating layer, as claimed in amended claim 1.

The irradiation of a light or electromagnetic wave on the photoconductive material layer in claim 1 is performed through the insulating layer which is formed on the photoconductive material layer and near the carbon nanotube. Thus, a position to be irradiated is predetermined to be near the photosensitive material layer and the carbon nanotube.

By contrast, in Watanabe, as shown in FIG. 9, the substrate is irradiated with the optical pulses on a lower surface thereof which is an opposite side to an upper surface on which the electrodes and the carbon nanotube are formed, and the optical pulses pass through the substrate, and then the carbon nanotube on the upper surface receives the pulses. Thus, the position to be irradiated is totally different from claim 1 of the present invention.

Therefore, amended claim 1 is patentable over Watanabe for the foregoing reasons.

Claims 2-3, 5-10, 13-14, 16-17, and 19-20 are patentable due to their dependence from amended claim 1.

Further, Watanabe fails to disclose all of the limitations of claim 2. In claim 2, the photoconductive material layer comprises a single layer structure or a multiplayer structure, where the structures are made of a plurality of kinds of photoconductive materials having photoconductivity in different wavelength ranges. In such a manner, it is possible to produce an optical sensor having sensitivity all over the photosensitive wavelength ranges of the respective photoconductive materials.

By contrast, in Watanabe, a dispersion elimination layer 8 is composed of only one material, for instance, InP. Accordingly, even if the dispersion elimination layer 8 can be applied to the present invention as an optical receiver, the sensing would be performed within photosensitive wavelength range of only InP and the wavelength ranges would be narrow.

Therefore, claim 2 is patentable over Watanabe for this additional reason.

With regard to claims 9 and 16, Applicant submits that Watanabe does not disclose that the electrodes have a comb-like shape and are disposed on the transparent or translucent insulating layer to be opposed to each other, while a large number of carbon nanotubes including the carbon nanotube are connected in parallel between the two electrodes.

As shown in Fig. 11, electrodes of the optical sensor of these claims have a comb-like shape and are disposed above the transparent or translucent insulating layer to be opposed to each other, while a large number of carbon nanotubes are connected in parallel between the two electrodes. In this manner, by using such comb-like electrodes having a multitude of electrode-fingers, a large number of carbon nanotubes can be connected in parallel between the two electrodes, and consequently, the output of the optical sensor can be increased.

In Watanabe, by contrast, electrodes 16a and 16b (Fig. 5c) are rectangular, not comb-like shaped. Accordingly, there is a limit to the number of the carbon nanotubes which can be arranged and the same effect of the present invention mentioned above cannot be obtained.

Therefore, claims 9 and 16 are further distinguished over Watanabe.

In view of the foregoing, Applicant submits that the application is in condition for allowance and such action is earnestly solicited.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323, Docket No. 102212.57243US.

Respectfully submitted,

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